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JOURNAL
R. A. I. C.
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WE suppose that very few architects in Canada have read the greatest book yet written on contemporary architecture — *Space, Time and Architecture* by Professor Giedion of Zurich. If it were more widely read, perhaps we would see fewer clichés. We would be conscious of an architecture that had roots, and a long, if sometimes interrupted, tradition. We could not possibly see it as a fashion to be thrown aside, like long skirts, when the novelty had worn off. In his analysis of modern architecture, Professor Giedion has opened up endless vistas that make a walk in any American or Canadian city an exciting experience.

IN the past we had enjoyed seeing evidence of the Greek and Gothic revivals, and a Greek porch on a farm house or a church in carpenters' Gothic would remind us of the literary giants who had, to some extent, been responsible for their creation. They were echoes, as it were, of voices thousands of miles away and long ago — the voices of Byron, Shelley, Keats, and of Ruskin, Pugin, Sir Walter Scott and many others. But to see the evidence of the Romantic Movement, one had to find an old city, as cities go in this continent — something older than 1850. Our interest was not, we hope, a sentimental one. We were looking at buildings, admirably done, that reflected the mood of an age. However misguided that age, these were its monuments and its records in stone and brick and wood.

PROFESSOR Giedion has made the period from 1850 an even more exciting one. He writes of a time that did not look back to the city state of Athens or of Venice; to the days of chivalry or the noble Goth. His is a period that looked forward in a spirit of high adventure, when people daringly used new materials and cast aside old forms. His examples are the buildings we had previously ignored, and they are to be found in almost every city and town.

DURING the last month we visited St. Louis, Missouri, and, between meetings, went in pursuit of some of the buildings illustrated in *Space, Time and Architecture*. The area which we explored is the old city, and a large part of it has been pulled down to make way for a new park. Even so, we found many of the buildings we were looking for with cast iron columns, and glass from floor to ceiling. The best example was missing, but we were delighted to hear that it has been saved, and would be used as a museum. These little façades in cast iron were the forerunners of the steel buildings of Chicago of a later day, and of the great steel structures of our own. From St. Louis we flew to Chicago, where again we followed in the footsteps of Prof. Giedion and saw the Leiter buildings by Wm. Jenney, and the Opera House and Carson Pirie and Scott's store by Louis Sullivan.

ALTOGETHER, we got the impression that great things had happened, and were happening, in Chicago, and that, for the architect, it offered more than New York. In one hectic day we saw a dozen houses by Frank Lloyd Wright, and Skidmore, Owings and Merrill's Recreation Centre at the Great Lakes Training Centre. On another, we saw the offices of the Container Corporation where colour has been used with a skill and daring that leave a lasting impression on a visitor, and cannot help but have a profound effect on the minds and lives of the staff. We are going back to Chicago.

THE Annual Assembly of the R.A.I.C. at Niagara Falls promises to be one of the best in the history of the Institute. There is no doubt that the Council is sparing no effort to make it so, professionally and socially and the place itself is a never ending, and ever changing, source of interest. We never visit Niagara Falls without an intense feeling of pride in the achievement of Canada in general and the Niagara Parks Board in particular. Across the river one gets an impression of a congested residential and industrial area, but on the Canadian side one can follow the river for twenty miles or more through park and pleasant countryside. Niagara-on-the-Lake at the end of the drive is an almost unspoilt colonial town of great charm with houses going back to the war of 1812. Even the winter deals gently with Niagara-on-the-Lake, and the chances are there will be no snow.

Editor

STRUCTURES FOR INDUSTRIAL BUILDING

By CLARE D. CARRUTHERS

WHAT is the structure of any building? What parts of a building go to make up the structure? A possible definition would be—any part which is calculated to take stresses caused by the forces of gravity or by lateral forces due to wind, earth pressure, forces due to moving objects, earthquakes, and forces due to temperature changes.

More specifically we think of the joist, plank or slabs, the beams and girders, the columns and walls, the vertical and horizontal bracing members, the foundations and their supporting soils. It is with these items in their various forms and in the method of connection that we will attempt to deal in this article.

The first question to be decided before starting the working drawings of a building should be "what materials are to be used in the structure?" The more important factors which decide the issue will be the proposed use of the building, the spacing of columns, the loads to be carried, the amount of vibration from machinery, the nature of the soil for foundations, the size, shape and contours of the property, the locality of the building, the time of year of construction, the speed of construction required (desired is a better word to-day), the length of life of the building—all in the light of the number of dollars there are to spend.

Most Architects and Engineers have a good knowledge of the various materials for structures and their relative costs. However, a recapitulation here in table form may be of value for the brief discussion following. They are listed approximately in an ascending scale of cost, of durability, and of fire resistance. Special factors may change the location in the list of any class but not by more than one or two places.

Wood sheathing on wood joist supported by wood beams and columns with wood stud and wood siding is still by far the cheapest form of construction in general use to-day. It is the least fire-resisting, requires relatively close spacing of columns and has a relatively high maintenance cost. The addition of masonry exterior walls improves resistance to external fires, and reduces maintenance costs, but causes an increase in original cost.

The use of Open Web Steel Joist has been considerable in recent years to achieve longer spans between supports due to the lack in the eastern provinces of long span wood joist. The cost over wood joist is slight. Either wood or steel may be used for supports.

A Wood Sheathing on Wood Joist	Beams — Wood Columns — Wood Walls — Wood or Masonry
Wood Sheathing on Open Web Steel Joist	Beams — Wood or Steel Columns — Wood or Steel Walls — Wood or Masonry
B Wood Plank	Beams — Wood or Steel Columns — Wood or Steel Walls — Wood or Masonry
Mill Construction	Laminated Wood, on wood beams and columns, masonry walls
C Steel Type Deck	Beams — Wood or Steel Columns — Wood or Steel Walls — Wood, Metal, or Masonry
D Precast materials as sheathing	Beams — Steel or concrete Columns — Steel or Concrete Walls — Metal or Masonry
E Poured slabs on Open Web Steel Joist	Beams — Steel or concrete Columns — Steel or Concrete Walls — Masonry
F Poured in place slabs	Beams — Steel or concrete Columns — Steel or Conrete Walls — Masonry Steel beams and columns may or may not be fireproofed

TABLE OF MATERIALS FOR STRUCTURES

Laminated wood floors or roofs on wood beams and columns, with masonry walls, commonly called mill construction, is the most economical type of low fire risk construction, and has a better fire insurance rate than unprotected steel. Single storey buildings with bays of 20 x 20 feet or slightly larger are easily possible. Multi-storey buildings will probably require a reduction in the bay size to keep the members of reasonable dimensions. Strong species of wood such as B.C. Fir, Oak, etc., are required for this type of construction. Walls of the curtain type may be masonry or wood plank; when of the bearing type they should be of masonry.

There are certain adverse factors to the use of this type of construction. Many if not most of the wood beams and columns available to-day lack adequate seasoning

or drying and early in their life are subject to extensive cracking which, though unsightly, is not usually of serious structural significance. What is worse is the lack of grading of structural timber. It is certainly very noticeable in some large eastern cities. Defects such as diagonal grain, size and spacing of knots are not given much if any consideration. The result is that second and even third grade timber is used at stresses intended only for select structural grades.

Wood is subject to dry rot under certain conditions of temperature and moisture if the spores of the fungus are present. Thick laminated floors (over 4″) when air sealed on top frequently develop signs of rot. The base of columns and the outer ends of beams are other possible spots where rot may develop. In certain areas (though not very prevalent in Canada) Termites may cause extensive damage.

Steel deck roofs, (there are several types manufactured) can be supported on wood, steel, or concrete beams but are most commonly used on steel framing. They are light in weight, even a few pounds lighter than wood plank, easily laid, and non burning. There is no shrinkage problem, and no chance of rotting as with wood. There is a possibility of rusting. There is no insulation value. The cost is slightly greater than wood plank.

Precast slabs of concrete, gypsum, or asbestos come in many forms and cannot be described here in any detail. They may have steel, concrete or wood supporting members, although the combination of wood and concrete is unusual. They are fireproof and the concrete types are impervious to moisture. This moisture resistance makes them particularly useful in areas that have high humidity. They have little deterioration and have a high salvage value if a building is torn down.

Poured or pre-cast slabs on open web steel joist form a good framing system for roofs with ceilings below. Without ceilings the appearance is not of the best. Standard type joist may be used up to about 30 foot spans and long span joist will span considerably greater distances say up to 50 feet. These longer span joist may be spaced out to six or seven feet and give a good appearance without ceilings. Poured concrete slabs on steel joist are seldom, if ever, used for industrial floors. The thin slabs and lower rigidity of the joist as compared to other types of concrete are not suitable for machinery installation.

Poured in place concrete supporting members are the best, although the most expensive, types of construction. If the steel is properly fireproofed, both rank as Class A construction under underwriters code. In addition they provide good mediums for concentrated load distribution, and have ample rigidity.

Walls of various types may be used with any of the types of construction. Some of the various types are listed:

Bearing Types

Wood stud with wood sheathing
Concrete type block
Tile
Brick with Concrete type block or tile
Solid brick
Stone as facing or solid (unusual in industrial work)
Poured in place concrete

Non-Bearing Types

Precast types on steel or concrete frame
Interlocking self-supporting precast types
Metal sidings or asbestos on steel or wood frame
Finished or coated metal on steel or wood frame
Stucco types on lath on steel or wood frames

The first group are well known. They are listed in ascending order of cost. They are the types most generally used in present day construction.

Some of the second group are not so well known. There has been no attempt to give them any order of value. Too little is known about their relative cost. The precast and the interlocking types are particularly interesting in prefabricated types. They indicate an attempt to provide larger units of masonry type wall construction. These are still in their infancy but show signs of developing into lusty competitors of the older types of wall construction.

So far we have considered only materials and types of construction. In deciding the type of construction used in any particular building the factors mentioned earlier in this article will all be taken into consideration. Whether the building is to be of single or multiple stories will be decided in the process and routing planning. The differences in cost of single storey and multiple storey building, provided there are good soil conditions, is not an important factor. The difference in cost is small. Let us examine the factors previously noted.

Is the building of a permanent nature — a life span of 25 years or more? If so, the material chosen for the structure should be such that there will be little deterioration. This would tend to rule out any light type of wood framing; mill construction or better can be considered acceptable.

The degree of fire-resistance required depends on the nature of the industrial process, the amount of fire protection available, the locality of the building, the use of sprinklers and fire insurance rates.

The loads to be carried depend primarily on the use of the structure. In general it is best to plan to have the heavily loaded sections of the structure on floors on earth. The cost of a structure varies as a direct function with the load carried. Live loads should not be pared since there is a tendency to use heavier machinery in industrial processes. On the other hand do not decide live loads by the weight of the heaviest machine divided

by its net area. There is always some distribution of such loads to nearby unloaded areas. Each condition needs its own study. 100 pounds a square foot is an absolute minimum and 125 pounds a more general minimum in building codes. The type of structure used is also a factor since some types distribute loads better than others and are more capable of safe overloading.

The conditions of use are likewise a factor; for example, under certain conditions of temperature and moisture concrete might be much more serviceable than wood, on the other hand wood might not be affected by fumes which would attack steel. Again there are certain chemical reactions with concrete which might not occur with wood, etc.

Vibration is also a factor to be considered and equipment which has moving parts, such as heavy looms, presses, etc., should be used only in structures which have sufficient mass to at least partially absorb the movement which becomes objectionable when motions of various units become synchronized.

The spacing of columns may be determined automatically by process and routing planning. If this is not the case then the following factors should be kept in mind. The tendency is to wider spacing of columns. Eighteen to twenty feet should be considered a minimum width, sixteen feet an absolute minimum. With present day materials of construction there is no need for the ten and twelve foot spacings found in some existing buildings. The cost of structural work varies approximately as a second power function of the span and as a direct function of the load. Hence, if possible, heavily loaded floors should have closer spacing than for lighter loaded floors and for roofs. The shape of the property will be another determining factor as will the nature of the underlying soil. The higher bearing soils will allow, as a general rule, a wider spacing of columns. If piles are required this will also tend toward a wider spacing of columns unless the loads are very heavy.

Before starting any building project, preferably before buying the property, a thorough examination of underground conditions should be made.

Often the location of old creeks, ravines, filled ground are known by older members of community or by Engineers who have had previous experience in the area. If not test pits or borings should be made. Such knowledge has saved many a prospective owner from an investment which later experience would have shown him to be very costly. Fill or wet sand or just water can add many extra dollars to the cost of the project. If better properties are not available at an economic price and a property with poor undersurface conditions must be used, then consider these items. If soil is of fair bearing value, but wet, plan to keep away from underground rooms. Where necessary, waterproof basement areas. If soil is of poor bearing value, ½ tons to one ton, plan for one storey structures of light construction with relatively close spacing of columns. Where loads are such as to require a matt foundation, that is the whole area of building covered, plan for even spacings of columns without any large spans. Walls of building should be arranged to give evenness of load for full perimeter. Uniform distribution of load on the soil is the objective. Even settlement to a minor degree is relatively unimportant. Unequal settlement, though small, often results in cracking with varying degrees of seriousness.

The size, shape and contours of the property and its locality will be a determining factor in the choice of structure in many cases. For example, City building codes will narrow down the choice. In distant areas availability of materials may be the important factor. Narrow lots and small lots tend toward multiple stories to achieve required floor areas and make economical use of the land. Sloping lots tend to basements or part basements. Lots which are fully covered by buildings have little storage space, which suggest the use of materials easily stored by stacking or requiring no storage on the site during construction. These may be deciding factors in the choice of structure.

The time of year for construction may be a very vital factor in your choice of construction. Concrete construction is not easy to handle in extreme cold. Steel erection is easier and once erected makes enclosure by tarpaulins easier. Precast materials are better for cold weather conditions than built in place types. However, remember that it is always better for the finished building, and more economical, to begin construction at a time that will allow the greater part of your structure to be built and enclosed during the milder seasons of the year.

The amount of time available for completion of the new structure will have a bearing on the choice of materials. All materials are now in poor supply but there are generally some small advantages to be gained in using one material rather than another. These advantages will change with the supply situation and over very short intervals of time. Each job must be examined for the effect of this time factor. It may be wise to use a more expensive type of construction if it is more available and will get the plant into production a couple of months earlier.

The foregoing remarks have given some of the important factors that will decide the nature of the building structure. Each needs to be evaluated and weighed against the value of other factors. There are other factors that may influence the type of structure but if those enumerated above are properly evaluated each building will have the type of structure most suited to it.

Having decided the type of structure, the loads it is to carry, and spacing of columns, the next problem is how do we put it together. We are quite accustomed to the use of nails, bolts, rivets, for steel and wood. Of course concrete is mixed and poured into forms into which steel reinforcing bars have been placed. Certain new developments in the connections of wood and steel

are worth discussing and certain items regarding reinforced concrete should be discussed.

The newest connecting medium for wood is glue. It is quite old in use but new in its large scale applications. Glued up wood members of considerable size and of varying form have been constructed very successfully during recent years. Ring connectors give another method for effective connections of wood members. They are most useful in the connection of wood trusses built up from 3″ and 4″ or larger thickness of material.

For steel the latest developments are in the field of welding. Welding along with flame cutting has made practically possible the use of steel shapes of much greater variation in form than was possible with shearing and riveting.

These factors have tended to the development of a special form of arch construction termed rigid frames. Since rigid frames require high resistance at the joints or bends in the structure they are very effective in the resistance of horizontal forces or out of balance vertical forces. The question of economy is one which cannot be categorically stated. In some cases they are definitely cheaper than standard forms of construction. In most I would suggest they will be more expensive. Unless a rigid frame serves some definite purpose then it is better to stick to standard forms of construction.

With wood, rigid frames built up by glueing together thin pieces of wood can be fabricated in the mill with reasonable economy. When well finished they make very attractive looking structures for use exposed in halls, churches, gyms, etc. Without much finish, or when covered in, they can be used for prefabricated buildings of either temporary or permanent nature. Spans of forty or fifty feet are not unreasonable.

With steel rigid frames our boundaries of use are widened over that for wood since steel may be welded both in shop and field while to the present the glueing together of wood in the field has been a difficult job. Steel frames may vary from the ordinary rectangular frame to a series of sawtooth frames, monitors or arches.

Concrete has always been adaptable for rigid frames since it is comparatively easy to vary the shape and the reinforcing of concrete members.

Some of the various forms of "Rigid Frame" roofs are indicated in Figure 1. There are probably more shapes and there are many possible combinations of those shown. Many of these form very useful sections for industrial building structures. Others would appear to be very specialized forms.

The commonest type of Rigid Frame is indicated in (a) and (b). This type has been in use in some degree or other for many years for the resistance of wind, crane or other lateral stresses. With riveted or bolted structures it is argued, whether correctly or not, that the moments at the corners need only be developed to the extent of the moments from lateral forces. The assump-

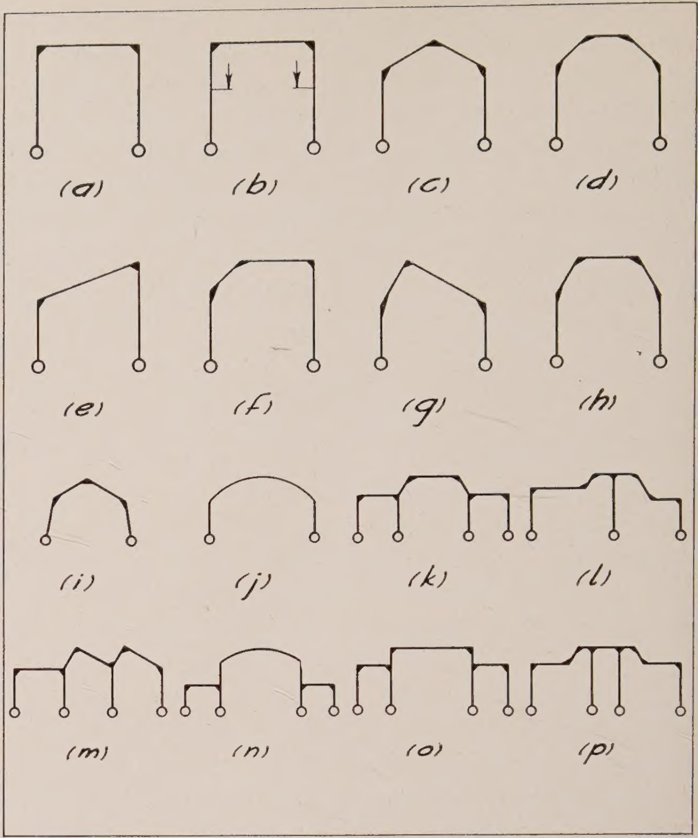


FIGURE 1

tion is made that there will be sufficient slip in the connection to relieve it of any stresses over that figured. With welded connections slip in a weld means failure. Hence all stresses must be taken into account no matter whether their source is vertical or horizontal loads. This tends to reduce the size of the horizontal member and increase the size of the vertical members. Whether economy results or not, depends on each particular bent and its loading. The effect the reducing of the depth of horizontal members (for example from a truss to a rolled section) has on other parts of the building such as walls and heating equipment will often determine the economy. In general I believe there is a saving.

When a rectangular frame is expanded both horizontally and vertically we get a typical section of a multiple storey building. In such a building with a steel frame the use of rigid type connections with welding will definitely achieve economy in material and if reasonable simplicity can be maintained in the welded connection it will achieve economy in the structure as a whole. The cost of figuring accurately such structures may void some of the saving due to increased cost of consultants fees for this type of work.

In industrial work where sawtooth or monitor construction is required for lighting interiors these types of framing do the job very neatly, effectively and economically. The introduction of welding has made the development of the connections relatively easy for shaped bents of these types.

In this regard one thing should be emphasized regard-

ing these connections. In nearly all cases the webs require stiffeners at points of high stress. These stiffeners do not always produce an aesthetic pattern. The alternative is thickening the web plates and using small gusset stiffeners in the corner between the web and the flanges. This second method is more expensive. If you consider the appearance of the normal industrial building when ready for operation with pipes, wires, signs, ductwork, lighting fixtures, etc., you will realize that too much finesse in the finish of the connections is a waste of time and money. You do not see it in the completed building unless you have been grossly negligent and created an ugly sore thumb which is repeated many times. The use of rolled sections with welded connections is so much of an improvement in appearance over lattice-work trusses that too much worry over the appearance of connections can be avoided.

Figure (a) shows a riveted type of right angled Rigid Frame. This is a heavy type of industrial construction but does indicate to some degree the difference between riveted and the welded type of connections shown in Figure (b) which is a sawtooth roof framed building.

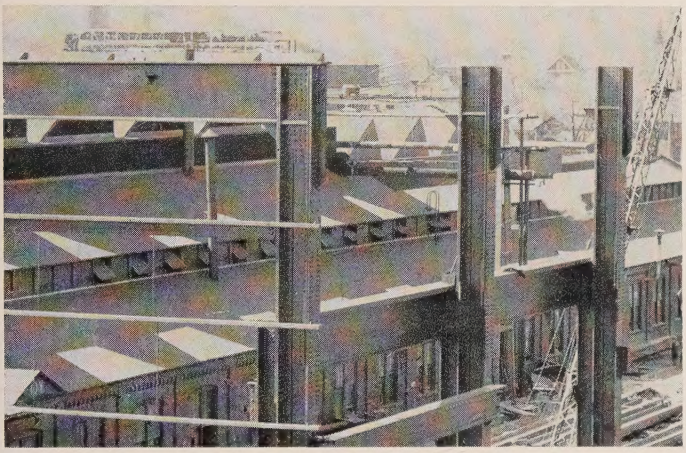


FIGURE A
Assembly Building, Canadian General Electric Company, Limited, Peterborough, Ontario.

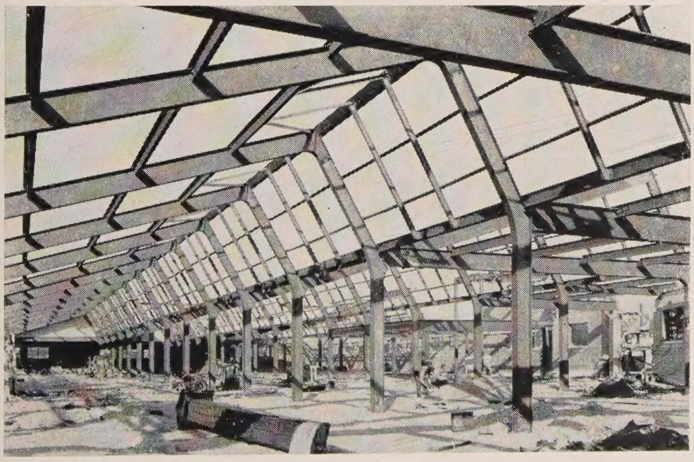


FIGURE B
Fractional Motors Building, Canadian General Electric Company Limited, Peterborough, Ontario.

Concrete structures always have been rigid frame structures although they have not always been thought of as such. Too often in the past they have been designed a series of beams and columns without sufficient thought given to the stresses at connections and the effect of adjacent members on one another. The placing of reinforcement requires more care than has been given in the past if we are to take full advantage of continuous construction and keep cracking to a minimum. Accurate placing and real securing and supporting of top steel are essential.

Any of the shapes indicated in the figures could be used in concrete. Due to the cost of formwork with long shoring, the greater dead weight, and in most cases no need for fireproof rather than non-burning materials in the frame, concrete has not replaced steel to any great degree for industrial structures. There are times and places when it could be used to advantage; for example in outlying northern Canadian areas where bulky structural steel might create a transportation problem much more difficult than cement and reinforcing steel. Again in multi-storey buildings with even spacing of columns and live loads of 125 pounds per square foot and over flat slab or mushroom construction makes a very suitable type of structure.

One other problem of industrial buildings is when, where and how many expansion joints. No one can be dogmatic on this subject. There are examples of buildings 1,000 feet long without expansion joints that have not shown any signs of trouble due to temperature stresses. There are other examples of much shorter buildings, 200 to 300 feet, which have cracking that appears definitely to be caused by expansion and contraction. It is probable that the kind of weather that occurred just before the building was finally enclosed and heated had much to do with the varying results. Once enclosed and kept heated a building changes very little in length due to temperature changes. A reasonable rule for long industrial buildings is expansion joints at not over 250-300 foot centers. Double columns should be used for structures having beams with heavy reactions on columns. Slottled holes and single columns may be used only for lightly loaded structures.

There are many other items of interest in the structures of Industrial Buildings simple as many of them seem to be. Each building requires its own individual study to determine what material to use and how that material may be most efficiently and economically used. One general rule that has not been previously mentioned and should not be forgotten is "Strive for Simplicity."

Canadians have in the last few years designed and constructed many Industrial Buildings; I am sure there are many more to do. Canadian Architects and Engineers have done, and will do, as capable work of this type as will those of any other country. We do not need imported plans.

MORE ABOUT PANEL HEATING

By KAREL R. RYBKA

INTRODUCTION

A conscientious student of recent American heating literature would be torn between diverse loyalties were he to try following all the controversial information published on the subject of panel heating. There is no single statement on the application, design and construction of panel heating that is not violently assailed from one side and just as violently supported from another. Fortunately, the practicing architect has little time to delve into the specialized literature on heating and thus proceeds usually according to more or less established lines and seldom runs into as serious troubles as to entirely swear-off panel heating.

It is, however, worthy of note that there is less disagreement about the merits of panel heating in England and Continental Europe, though there virtually thousands of installations of all sizes have been in use over the last thirty years. The main reason for it is the realization that ceiling panels are most successful and they are used everywhere, but in special cases.

BASIC CONSIDERATIONS

In the following notes and comments the highly favoured and widely used term "radiant" heating shall be avoided as a misnomer, when "panel" heating in general is meant. The use of this term "radiant heating" shall be restricted to "ceiling" panels. About 50 per cent of the heat supplied to a space from a floor panel is convective and though this share is lower for other locations of panels, it is still over 40 per cent for wall panels, but falls under 30 per cent for ceiling panels. In comparison, an "old-time" cast iron radiator does supply about 70 per cent of its heat output by convection and only the "convector" fully lives up to its designation, as — depending on the design of its enclosure — it supplies between 90 and 93 per cent of its heat output to the heated space by convection.

Thus, the behaviour of a heating panel will, by necessity, resemble in many ways that of the old cast iron heater, though the similarity is limited by the differences in maximum surface temperatures and masses of the two types of heating surfaces. There is possibly some merit to the statement of S. Konzo, of the University of Chicago, one of America's outstanding experts in heating research and R. W. Roose, who sum up results of a comparative research series conducted at the University of Chicago, as follows: "If the performance of the panel system tested in this structure, is representative of ceiling panel systems, some justification may exist for those engineers who claim that a panel system is merely another method of introducing heat into the structure."

It is now a generally recognized fact that the basic considerations for a heating system apply for panel heating to at least the same extent as for other heating forms; thus — the heat loss calculations for panel heated buildings and evaluation of heating surface, planning of piping and of auxiliaries, agree substantially with those of other systems.

There is, nevertheless, one major difference in the behaviour of panel heating and the conventional heating systems. It has been established that for comfort the air temperature and mean temperature of wall surfaces must be such to ensure a definite amount of heat dissipation from the human body. Such a comfort condition exists for American practice at about 70° F. air temperature and about 70° F. mean wall temperature at average air humidity. If the mean wall temperature is raised, the air temperature must, for equal comfort be dropped and vice-versa.

In a building of conventional construction and heated with "convectors," the mean temperature of the interior of walls or windows decreases, with a decrease in outside temperature, but the mean surface temperature of the heating surface, usually located under windows, increases. This behaviour tends to correct the effect of reduced window temperature and leaves it to the air temperature to balance the slightly decreased wall temperature. For equivalent comfort thus a rise in air temperature need be anticipated, to counteract the reduction of wall temperature. With reasonably good insulation of walls, this increase of air temperature would be very slight. It will practically disappear under the influence of such corrective factors as reduced humidity of the room air at low outside temperatures, and of increased convection currents due to increased temperature differential, which assure a slight increase of the average air temperature in the room at constant thermostat setting.

On the other hand the temperature of a heating panel will have to increase considerably at reduced outside temperatures, in order to supply the heat lost by transmission; this raises the mean wall temperature and in turn it will require lower air temperatures for maintenance of the optimum condition for comfort. The required temperature range of the air will be from about 63° F. to 70° F., and it will vary not only with the outdoor temperature, but with the wind and weather, and also with the mass and position of each panel.

It is more difficult to apply the established principles of comfort heating to panel systems and to successfully control the comfort conditions, owing to the noticeable inter-dependence of outside and inside air temperatures and also owing to the large size, great mass and the

inflexible location of panels and to the influence of many other factors, particularly the surface finish and insulating effect of heating panels.

Therefore errors of judgement are more readily made in the design of panel heating systems than in other heating forms, but — owing to its integration into the permanent structure, they are more difficult to correct. This applies less to radiant ceiling heating, as the heated masses are smaller and the surface areas less extensive, which in turn gives better response to controls, and also to corrective measures. The plaster ceilings are also more readily altered and repaired than the concrete or tile floors.

A careful survey of the recent engineering literature will show clearly that the unbiased experts of the standing of Dr. Giesecke, S. Konzo, Napier Adlam and others, are aware of and do not hesitate to stress the dangers of too casual an attitude in designing panel heating systems. It seems that the most vociferous disagreement with these cautious opinions comes mainly from the ranks of pipe manufacturers and installers, and only occasionally from an independent engineer.

ADVANTAGES OF PANEL HEATING

There are many valid reasons for the wide acceptance of panel heating and they must be heeded. Besides the purely esthetic reasons of absence of heating elements in the rooms, they eliminate the very effective dirt catcher, which the old-time radiator obviously is. There is also the practical consideration that a true radiant heating installation will place no restriction on disposition of furniture, etc. The amount of heat which even a "panel" transmits by convection is no actual measure of convection air currents. As the areas of heating panels are large and temperatures are low, the convection currents are proportionately less intense, and practically eliminate the transfer of dust and dirt from the floor to the areas above the heating surface. Thus, they entirely obviate the annoying dirty panels above radiators and reduce the cleaning bill.

The mild surface temperatures eliminate the drying, roasting and decomposing of organic dust on the panels that is inevitable on heating surfaces operated at temperatures above 150° F.; this drying action releases small quantities of irritant gases, such as ammonia, and is mostly responsible for the so-called "dry" air in convector-heated spaces. The feeling of dryness is further improved by the lower air temperatures carried with properly designed panel heating systems; the same amount of moisture gives a slightly higher relative humidity at a lower air temperature than obtains if the temperature is raised. The lower air temperature and higher relative air humidity with higher wall temperature are claimed to result in improved mental alertness and freshness of the occupant. It has also been proven that the air temperature in panel heated spaces is nearly evenly distributed, whereas in convector heated spaces it varies several degrees from floor to ceiling. This, and the lower air temperatures, ensure that open windows will not cause quite as much discomfort and draft as in convector heated rooms; the air circulation is slower, more even and less noticeable.

The low flow temperatures promise effective use of panel heating in conjunction with the much discussed "heat pump" and reversed refrigeration.

A very important factor in the rapid acceptance of radiant heating, is the fact that recent advances in installation methods have brought the cost of many carefully planned installations on a parity with the cost of convection systems. It is true, that in some instances additional work in the general building construction is needed in order to accommodate the panel heating. These hidden costs, if carefully analyzed, still may render some panel heating installations more expensive than other, more conventional forms of heating. On the other hand, in buildings where metal lath and plaster ceilings would be used regardless of the heating installation, only negligible additional costs would probably accrue by the introduction of heating panels. In some cases, certain simplifications of construction could even be credited to the panel heating, for example, where radiator recesses, wall chases for pipe and similar provisions will be obviated; and in those instances the total cost of the panel heating installation may actually be lower than a conventional heating system.

Considerable discussion has centered for quite some time around the fuel costs of panel heating and more conventional heating methods. Unbiased authorities consistently maintain that no valid proof has yet been given of large scale fuel savings in panel heating systems. However, there are diverse sources of slight fuel savings in a panel heating system, which should ensure an overall noticeable fuel saving. In this connection could be mentioned, the more uniform construction of walls, which is not reduced in order to provide radiator recesses and pipe chases; also the lower temperature of the supply and return pipes which will reduce heat losses in secondary spaces, pipe chases, etc.; and finally the usually more automatic control system that will ensure more economical operation of the entire heating installation.

There is no doubt that these qualities of panel heating, which are at their best in the radiant heating system, will outweigh many of its disadvantages and that it is a worth-while development.

DISADVANTAGES

Some of the potential troubles encountered with panel heating can be realized by study of a practical example. Let us analyze the heating of a storey of a large office building with heated space above and below; it is usual to subdivide it only after the building has been completed. In a building of this type, particularly with high, continuous windows, floor panel heating may lead to considerable trouble. In order to provide sufficient heating surface at the permissible floor temperature, it may

become necessary to design the bulk of the floor area as a heating panel.

It is self-evident that considerable unbalance of temperatures will then ensue if the space along the perimeter is cut-off from the remainder of the floor. As all heat from the building is lost through the outside walls, good practice will require all available heating surface to be concentrated in the offices along the building perimeter. If this is not practical, the outside offices will not be sufficiently heated on cold days unless the floor temperature is raised beyond the design limits, to an uncomfortable level. Simultaneously, the interior spaces will become hot and stuffy as unnecessary heat is supplied there. This unbalance and consequent discomfort will increase with falling outdoor temperatures; it is augmented by artificial lighting with its heat output which is usually required in the already overheated inside offices but not in use in the "perimeter" rooms.

The conditions deteriorate further if some of the "private" offices along the perimeter are provided with the customary heavy rugs, placed on dense floor pads. This additional, and during the design stage of the building unpredictable insulation, will cause a further lag in heat supply. Should such a room happen to be in the corner of the building, the results may become disastrous, as it is difficult to provide a heat output sufficient to meet the heavy losses of the corner room without seriously overheating other areas.

If these possibilities are foreseen in the course of design and the panels arranged in a manner that will suit sectionalizing, and if the local climate permits the installation of the required panel surface within say 10 feet of outside walls, little, if any troubles will arise from subdivision of the floor area, though the difficulties with floor coverings, and with furnishings that shut off sections of the heating panels, still remain.

It has been generally recognized that wall panels have very similar shortcomings and they are subject to serious interference from large pieces of furniture, pictures, etc.

The above analysis clearly points to the use of ceiling panels in all buildings without permanent floor plan, or where floor finishes or coverings may vary. The fact that only few floor installations have led to troubles, is not sufficient justification for neglect of these basic considerations.

Sometimes even uniform flooring and permanent division of the spaces is not sufficient protection from difficulties with floor panels.

Troubles have been encountered in earlier hospital installations of this type, particularly in Europe. This was in part due to high floor temperatures, which affected adversely the feet of the active nurses and orderlies; and on the other hand the patients were shielded by the beds and furniture from the direct radiant effect of the panels and felt chilly, unless the rooms were overheated.

Some of the troubles in residential work resulted from diversified types of floor coverings in the various rooms, and from the neglect of the difference in heat distribution and in comfort induced by identical supply temperatures, if the panels were located in the floor on ground and in ceilings of upper floors. It is then not sufficient to merely balance the output of the diverse coils for one condition. The more massive floor panels, with the required low surface temperature may have to be operated at different flow temperatures from the "lighter" ceiling panels, which permit higher surface temperatures without discomfort. The "lag" of the supply of heat of heavy concrete floor panels as compared with the plaster ceiling panels is also a contributing factor towards unbalanced heating in these systems; and last but not least is the fact that the "outside face" of the ceiling panels is affected by the variable heat loss to outside air, whereas the heat loss of floor panels is practically constant.

TEMPERATURE CONTROL

The behaviour of panel heating as compared with convective heating dictates the extent of the required automatic controls. The large mass of the panels causes a decided lag of response of heat output against heat demand. Thus it becomes necessary, with the majority of panel systems, to anticipate changes in demand by means of an outdoor thermostat, which will increase or decrease the heat output before a change in outdoor weather has penetrated through the building enclosure and has seriously affected the indoors condition.

It may also become necessary in more exacting installations, to adjust the indoors air temperature with changes in outdoor weather, and in some instances a balance between air temperature and mean wall temperature is being attempted by the introduction of a special "comfort stat" which simulates the reactions of the human body to temperature changes.

There is no doubt that proper zoning of a panel heating system is much more important than in "convective" heating, where the individual can easily correct variations in exposure of different rooms by adjusting manually the heat output of the convector.

LIFE AND MAINTENANCE OF HEATING PANELS

In addition to the foregoing considerations, the influence of the heating panel on the finishes of the building, etc., deserves some serious thought. In plaster ceilings with flow temperatures of the system below 120° F. little trouble need be expected. At temperatures above 120° F., discolourations of finishes and cracks have sometimes occurred.

Care must also be taken not to disturb the bond between pipe and plaster, as the ensuing expansion noises — though hardly noticeable in a commercial installation or in an industrial plant — become very annoying

in lecture rooms, classrooms, and more so in bedrooms, hospital wards, etc. Such a separation of pipe from surrounding plaster may occur in new installations where the plaster has not properly set before being subjected to high ceiling temperatures, or where the piping was permitted to heat up rapidly, whereas the surrounding panel material was allowed to lag in temperature.

With floor panels, care should be taken that the insulating value of floor finishes and of coverings does not exceed the calculated values; although most customary types of flooring materials do not deteriorate at the usual panel temperatures, often the adhesive materials used to secure them, soften, or some of the oils and other admixtures in the material — which ensure its flexibility and elasticity or its colour — evaporate readily at these temperatures and may cause serious troubles.

A hitherto neglected consideration, which has, however, been the cause of occasional trouble, is the fact that the surface temperature of floor under a heavy rug often needs to be higher than the recommended comfort temperature of about 85° F., to ensure sufficient heat output through the rug. If the feet are placed on the carpet, the so compressed area loses its insulating value and the feet will suffer from the higher surface temperature and retarded heat exchange.

OTHER CONSIDERATIONS

The more recent thoughts — in this country — to use heating panels for summer cooling may add to the worries. Floor panels are unsuited for cooling installations, as they lead to stratification, with "cold feet and hot heads". Even for ceiling panels, the local climate must be carefully studied. Although good results were achieved with panel cooling in the dry climate of Switzerland and related areas, it is no guarantee of success in the humid areas of the Great Lakes, or the Atlantic Coast, etc.

Though the surface temperature of the panels could be kept above the dew point of the air, it is not always possible to keep the pipes themselves at such a high temperature and still obtain sufficient cooling. As soon as the panel has developed hair cracks, condensation will form on the cold pipes and lead to discolouration of the panel and corrosion of the pipe. The deterioration of some early artificial skating rinks, has been attributed to condensation forming on and corroding the cooling pipes.

The only means to prevent troubles with panel cooling is careful dehydration of the air in the building and control of its humidity.

The uncertainty as to the content of destructive agents in some modern building materials also needs consideration. The presence of cinders close to a steel pipe is a serious, but carefully watched hazard. But, is it always known what is contained in the concrete enclosing the pipe? Recent troubles with the lead connections to plumbing fixtures in one building led to a thorough investigation of possible causes. These unused connections, inert to anything but sulphuric acid, were destroyed from the outside. Humidity in the air reacting with some residual salts in the iron oxide waterproofing which was used on the concrete floor slab, apparently had formed sufficient sulphuric acid to destroy the lead.

A similar case occurred in writer's practice many years ago. Several miles of wrought iron tubing for air were laid in the reputedly inert, special concrete finish of a floor. Within three years the tubing developed countless leaks. It was found that oils, used to treat the floor surface, had penetrated into the concrete, where they formed a very corrosive agent around the pipes. And, whoever has had occasion to investigate steel conduits and pipes that have been laid in concrete floors in factories, will know that often serious external corrosion starts in a very short time.

If we were always sure of the purity of the concrete, of the effects of treatment applied to the finished work, and that no spillage and waste will be permitted to saturate it, all would be well. However, we add very corrosive calcium chloride to concrete in the winter, mix into it iron salts for waterproofing, employ insufficiently neutralized metallic "armoured" floor finishes, which are trade secrets, use quick setting cements and insulating concrete, which may or may not have been tested for the particular usage, and do it all with impunity, hoping that all this will not cause troubles.

It is true that thousands of installations have been in successful operation for some years. But then, lead pipes were in use for centuries and only a recent installation developed the destruction mentioned above; and concrete has been used extensively for long years, but only recent practice reverts to the diverse mixes, finishes and methods of application which are mentioned above and of which we know very little.

CONCLUSIONS

All the foregoing points away from floor heating and to a more general use of ceiling panels. Although the majority of the installations in this country have been in the floor or consist of a mixture of floor and ceiling panels — as may have been thought best suited to the individual case — there is now a noticeable trend towards ceiling panels. The main reasons are the independence of heat distribution of the furniture layout and flooring, better and more sensitive control, less damage when repairs are required and often much smaller heating surface, and thus reduced cost.

In many cases the ceiling panels are the most logical solution, even if the outlined potential troubles did not exist. In this class are hospitals, hotels, schools, dormitories, bedrooms, etc. Ceiling panels are also preferable, where diversified floor coverings or large, low set furnishings will ultimately be used in the various spaces; residential buildings, clubs, office buildings and others, belong to this group.

(Continued on page 432)

ONTARIO PAPER COMPANY LIMITED, THOROLD, ONTARIO

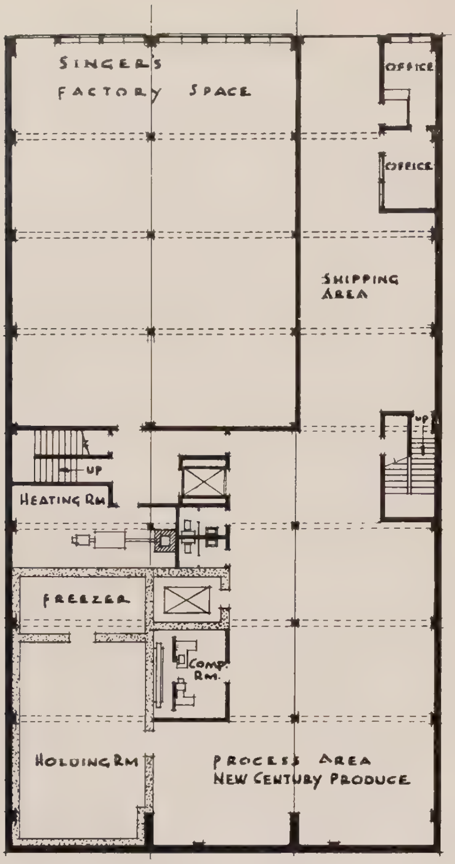
ALLWARD AND GOUINLOCK, ARCHITECTS

VIEW FROM SOUTH-WEST

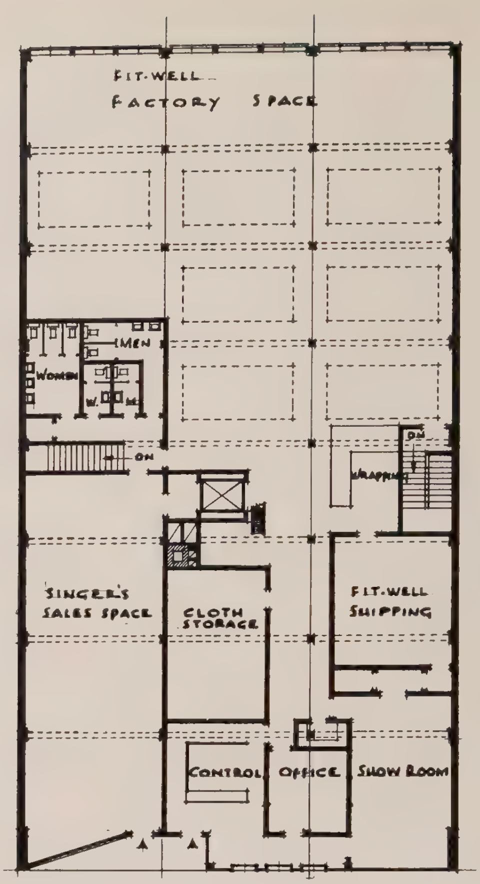
Photographs by Rice and Bell

VIEW FROM NORTH-EAST

VIEW FROM WEST



PLAN AT LOWER STREET LEVEL



PLAN AT UPPER STREET LEVEL

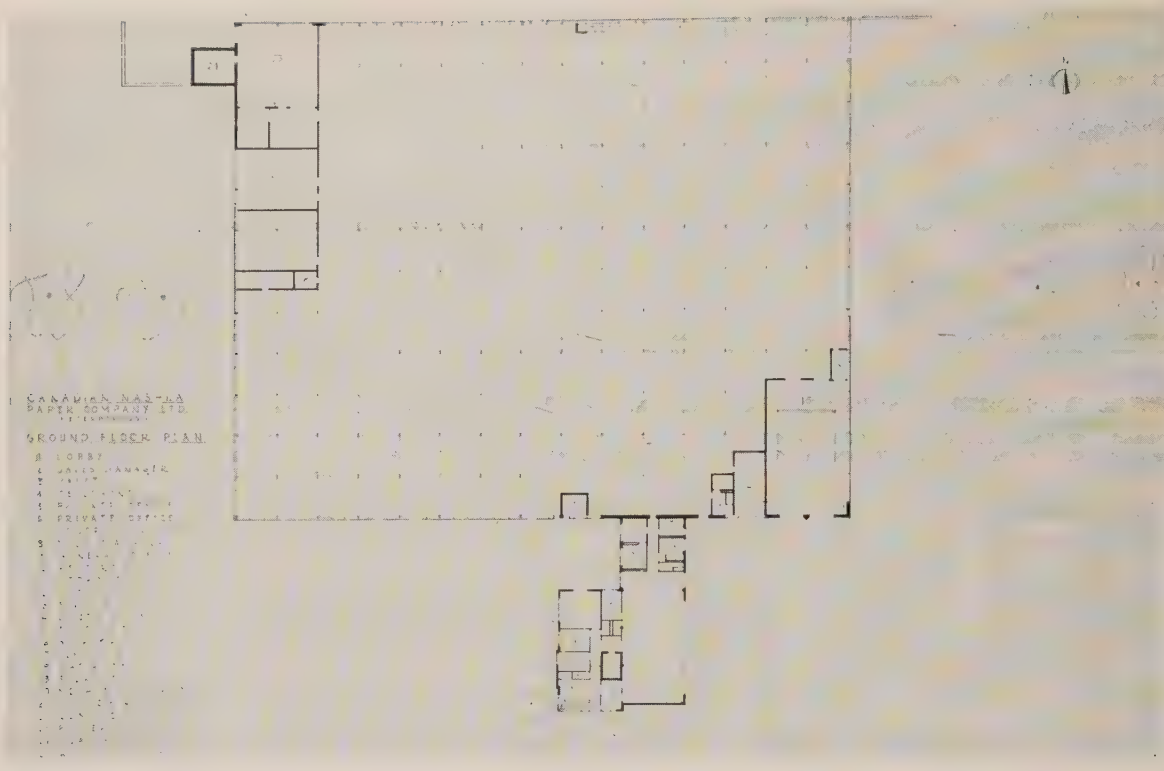
FIT-WELL GARMENT BUILDING, VANCOUVER, B.C.

ROBERT R. McKEE, ARCHITECT

SHOWROOM

Photographs by Graham Warrington

GENERAL OFFICE



GROUND FLOOR PLAN

CANADIAN NASHUA PAPER COMPANY LIMITED, PETERBOROUGH, ONTARI

GORDON S. ADAMSON, ARCHITE

OFFICE DETAIL

Photographs by Panda

RECEPTION LOBBY

THE BELL TELEPHONE COMPANY OF CANADA, TORONTO

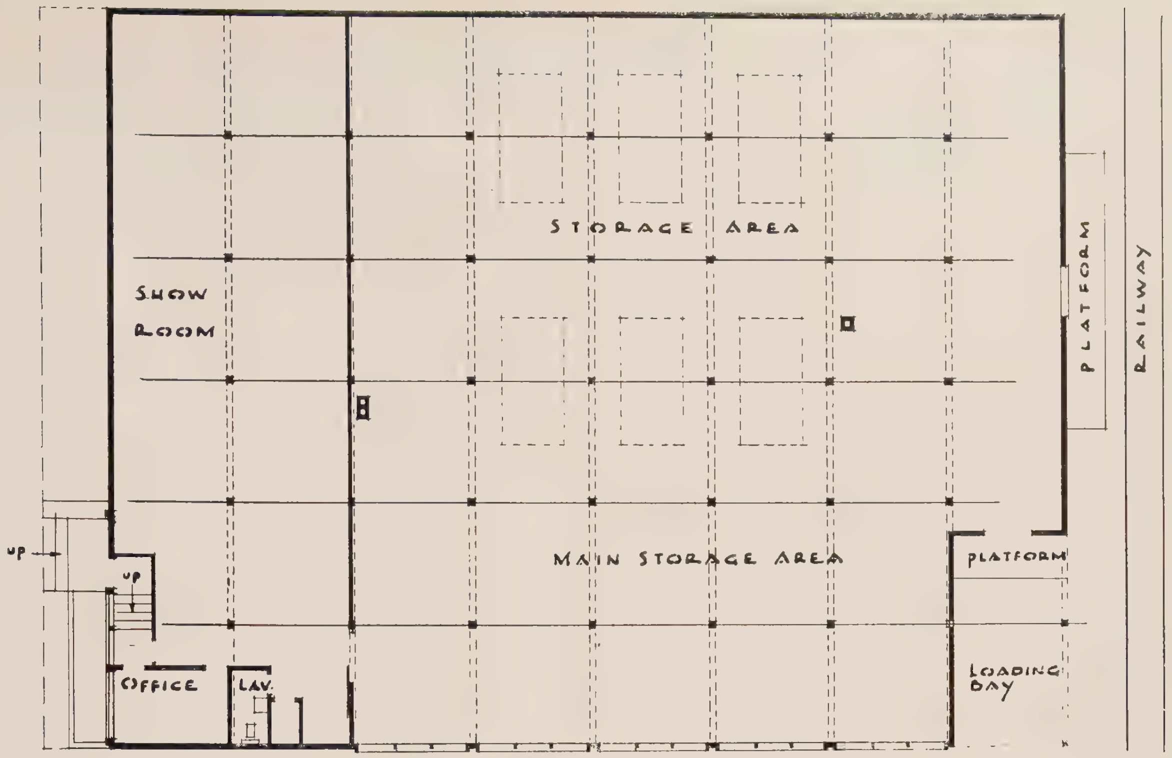
MATHERS AND HALDENBY, ARCHITECTS

PARISIAN LAUNDRY, TORONTO

MATHERS AND HALDENBY, ARCHITECTS

COCA-COLA LIMITED,
SANTA CLARA PLANT, CUBA

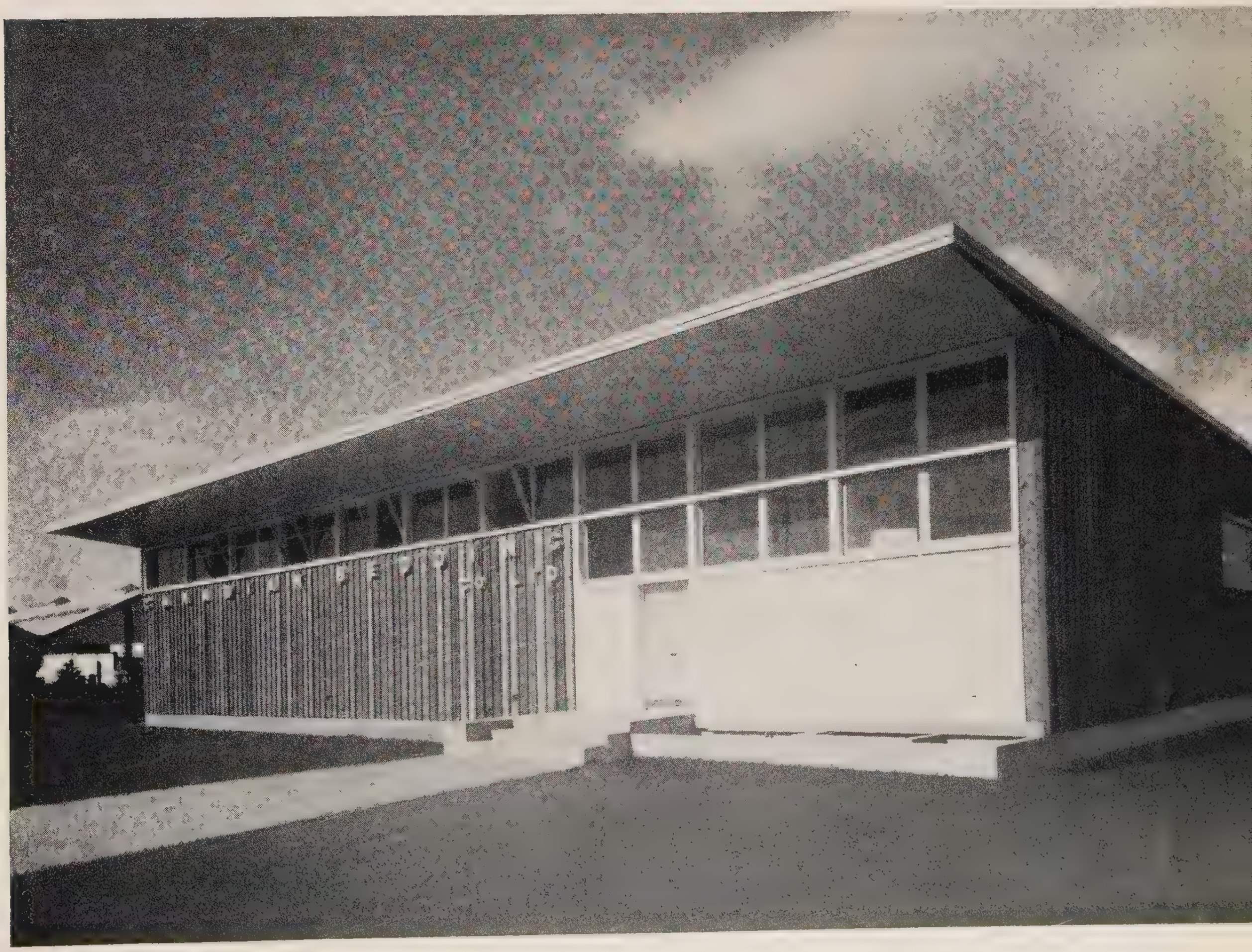
MATHERS AND HALDENBY, ARCHITECTS
MYRA Y ROSICH, ASSOCIATE ARCHITECTS



CANADIAN BEDDING COMPANY LIMITED, VANCOUVER, B.C.

ROBERT R. McKEE, ARCHITECT

Photograph by Graham Warrington



NATIONAL TEXTILES LIMITED,

LINDSAY, ONTARIO

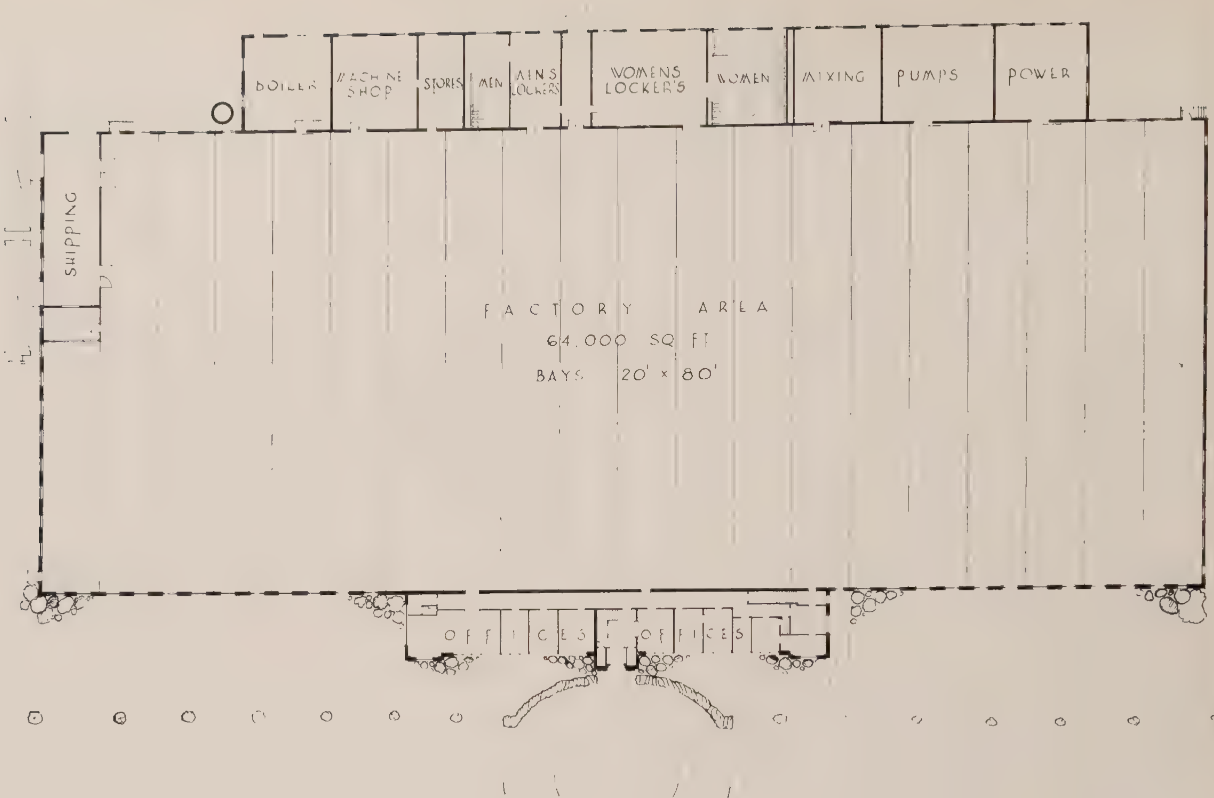
PAGE AND STEELE, ARCHITECTS

ENTRANCE DETAIL

Photographs by Warner Bros.

FOYER

EMPLOYEES' LUNCH ROOM



GROUND FLOOR PLAN

CANADIAN GENERAL ELECTRIC COMPANY LIMITED, OAKVILLE, ONTARIO

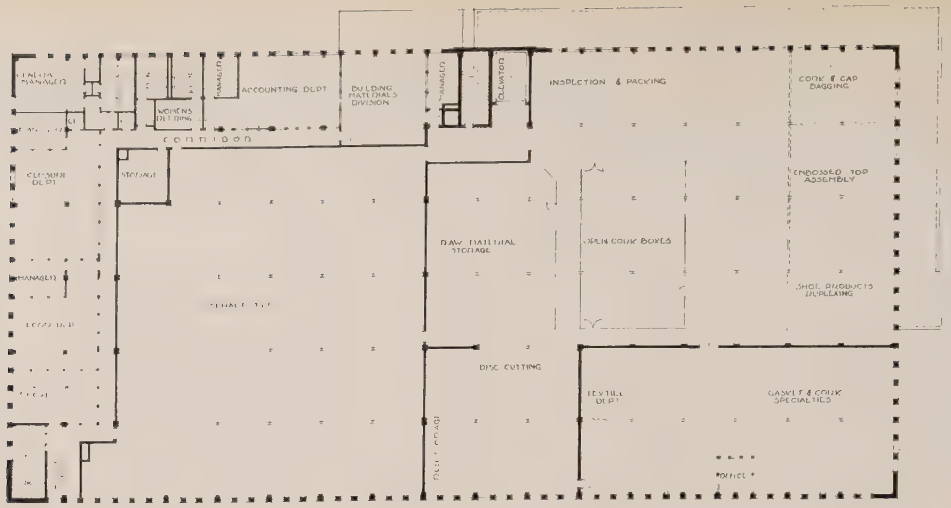
BECK AND EADIE, ARCHITECTS

Photograph by Panda

Photograph by Alan Walker

RADIO VALVE COMPANY OF CANADA LIMITED, TORONTO

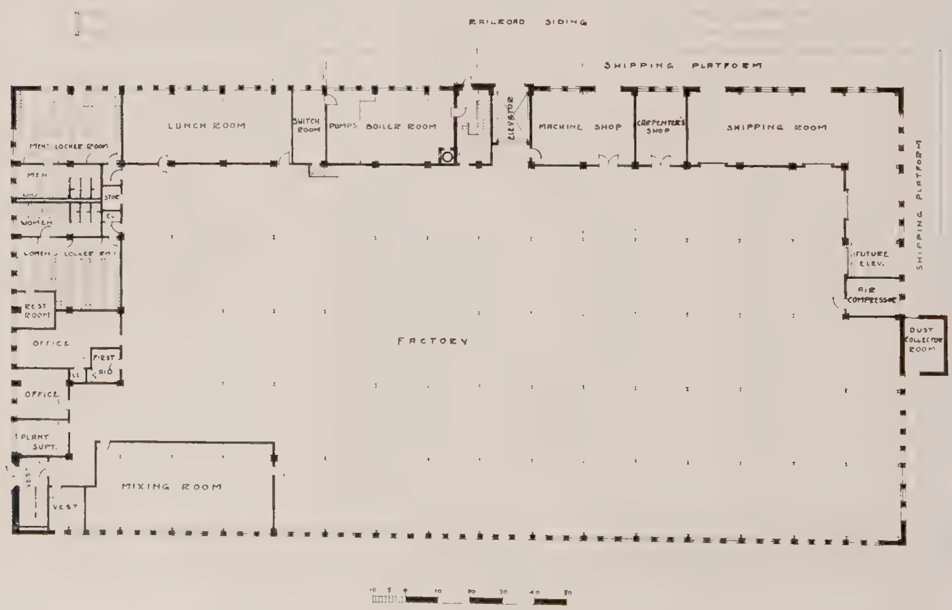
BECK AND EADIE, ARCHITECTS



SECOND FLOOR

ARMSTRONG CORK CANADA LIMITED, MONTREAL, QUEBEC

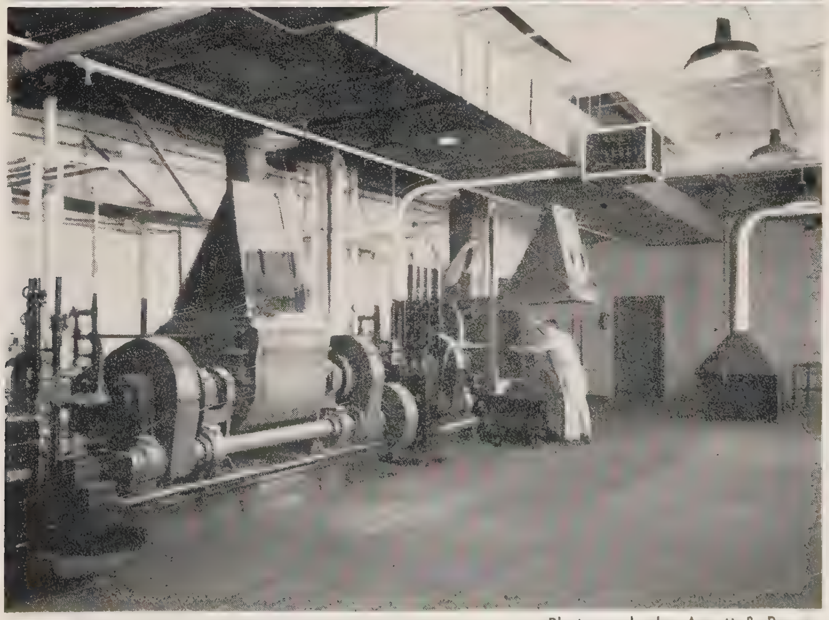
WOOD AND LANGSTON, ARCHITECTS



GROUND FLOOR

OFFICE

CROWN CAP LINE

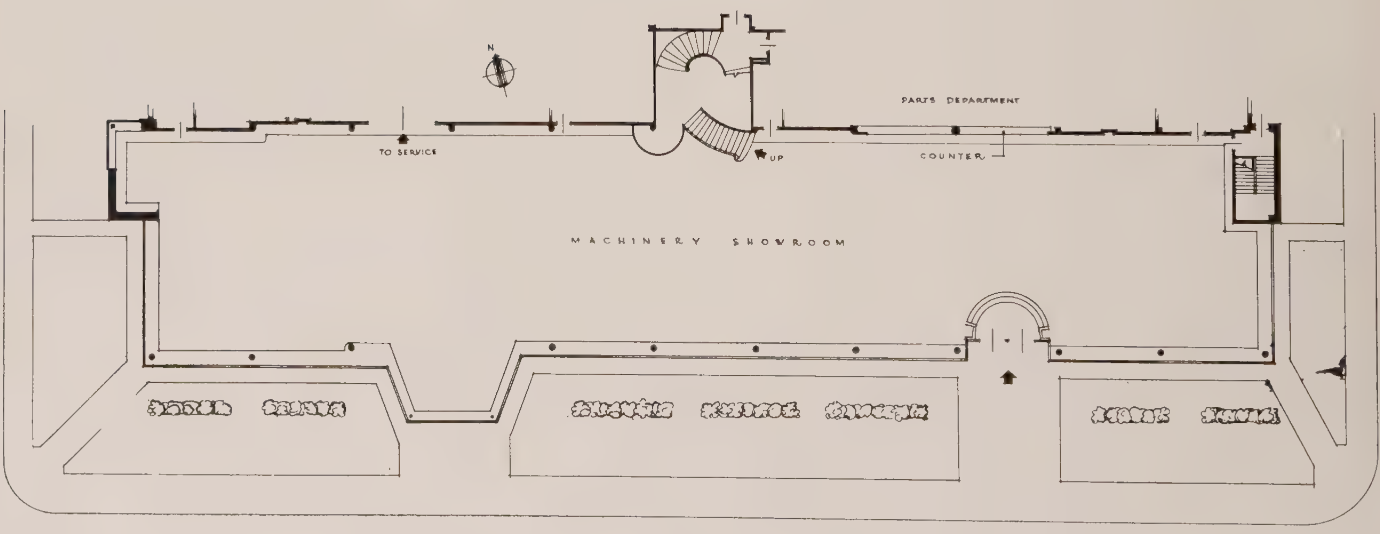


ASPHALT TILE
MIXING OPERATION

Photographs by Arnott & Rogers

SALES AND ENGINEERING BUILDING, MASSEY-HARRIS COMPANY, LIMITED, TORONTO

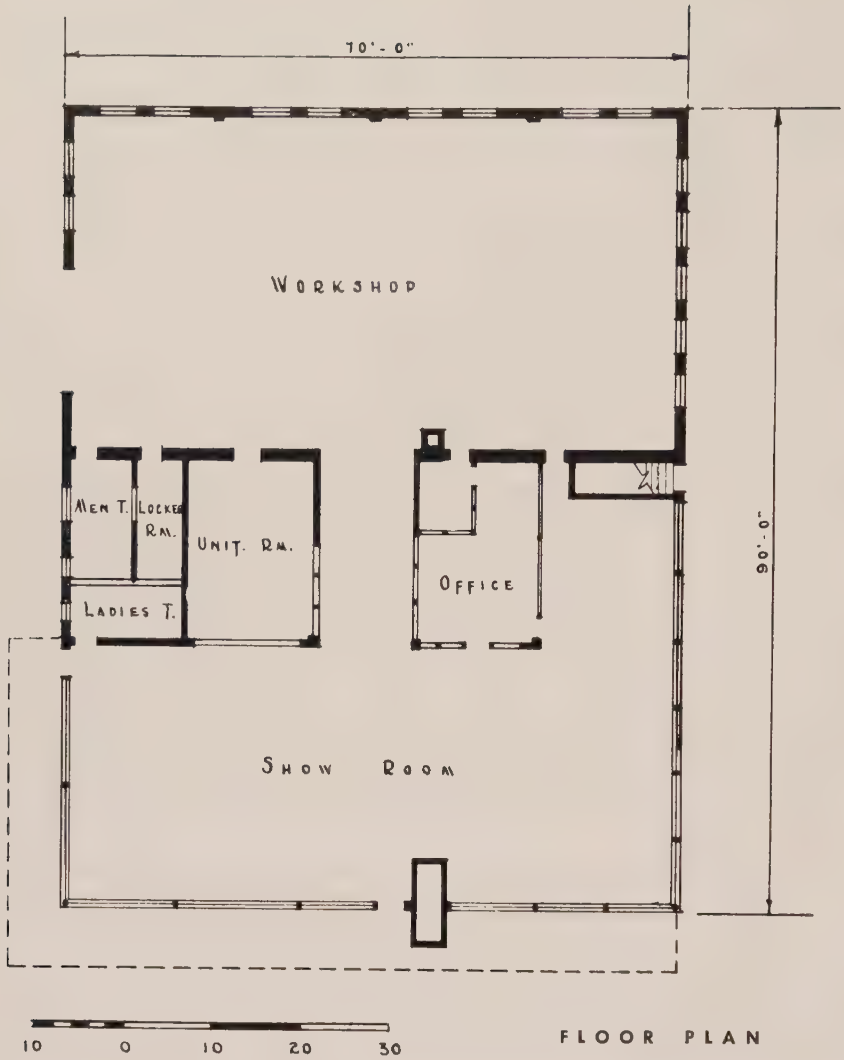
ALLWARD AND GOUINLOCK, ARCHITECTS



STAIR TO
SECOND FLOOR OFFICES

Photographs by Panda

DISPLAY AREA
FROM MAIN ENTRANCE



FLOOR PLAN

INTERNATIONAL HARVESTER
COMPANY OF CANADA LTD.
SHOWROOMS AND WORKSHOPS
YORKTON, SASKATCHEWAN

PORTNALL AND STOCK, ARCHITECTS

REAR ELEVATION

EVEN UP PLANT, MONTREAL, QUEBEC

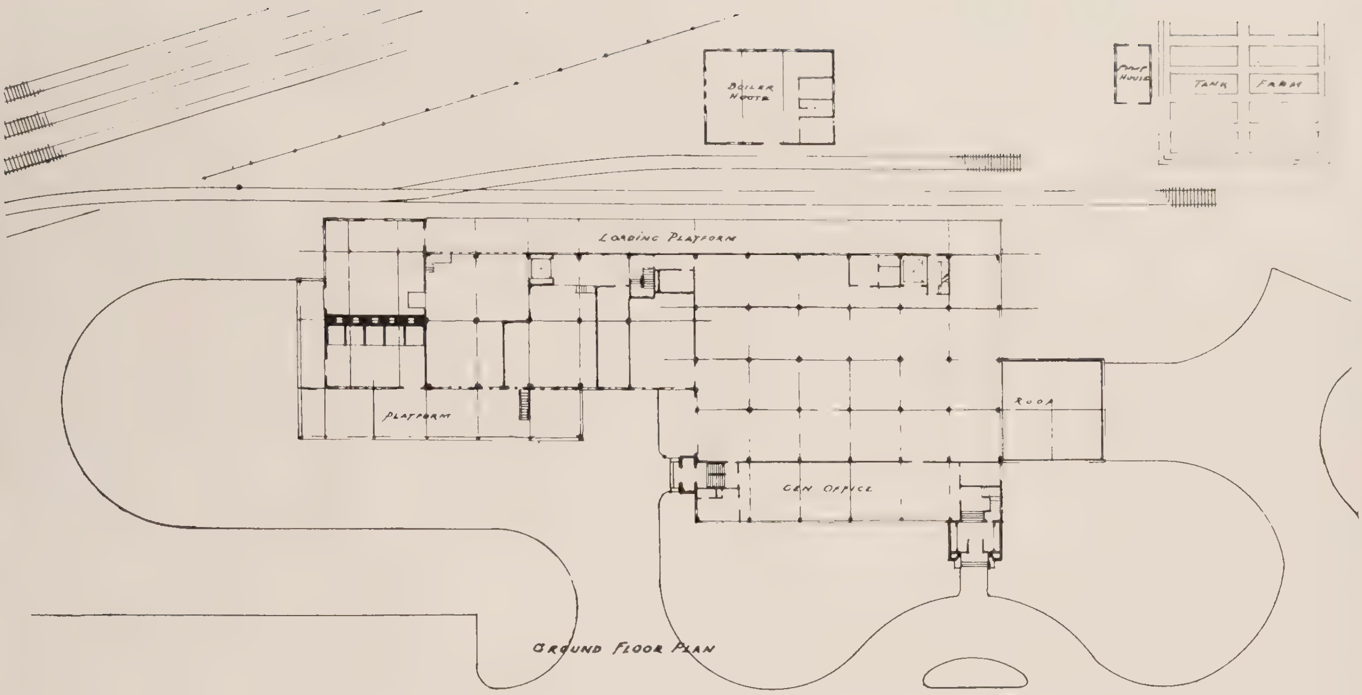
UKE, LITTLE AND MACE, ARCHITECTS

Photograph by Arnott and Rogers

Photographs by Rice and Bell

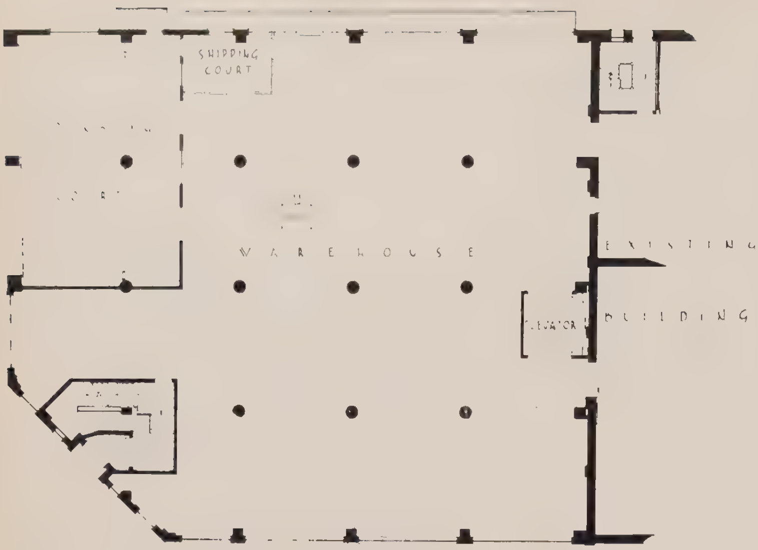
MURPHY PAINT COMPANY, LIMITED, LONG BRANCH, ONTARIO

J. C. MEADOWCROFT, ARCHITECT

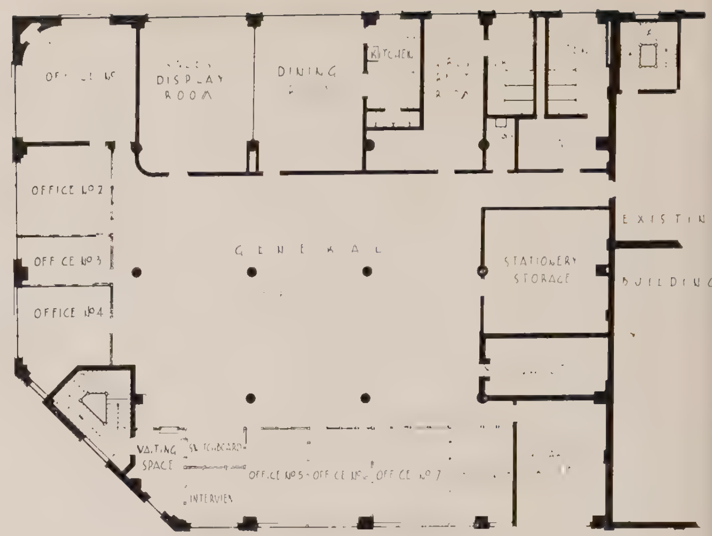


ENTRANCE DETAIL

OFFICE



GROUND FLOOR



SECOND FLOOR

BENJAMIN MOORE AND COMPANY LIMITED, TORONTO

BECK AND EADIE, ARCHITECTS

Photographs by Panda

OFFICE STAFF DINING ROOM

PRIVATE OFFICE

GENERAL OFFICES

SCHOOL OF ARCHITECTURAL DRAUGHTING OPENS IN TORONTO

By GRACE W. YOUNKIE

WITH the opening this fall of the Ryerson Institute of Technology, opportunities for the training of architectural draughtsmen in Canada have been broadened and extended.

The School of Architectural Draughting, one of the courses provided, fills a specific need. While it does not provide any basis for registration as a professional architect, it offers a broader and technically more advanced course than available in secondary schools and is designed to turn out highly skilled technological draughtsmen. Qualifications for entrance to the course requires Ontario secondary school graduation diploma and is open to those 18 years of age and over.

The Ryerson Institute of Technology is a development of the Training and Re-establishment Institute, part of the Canadian Vocational Training program for veterans of World War II. From the thousands enrolled in the various trade and technical courses, approximately 88 per cent of graduates were employed in their line of training. So successful was this training scheme that industry urged its continuance for civilians. And on September 22nd the Ryerson Institute was officially opened by Premier George Drew.

The shorter more intensive courses are now lengthened, mostly to two years and facilities are expanded to turn out graduates at a higher technical level. The two-year course in Architectural Draughting was carefully prepared by a group of architects and educators, and presents a comprehensive range of subjects related to architectural draughting. Teaching methods permit considerable personal supervision by the instructors.

A study of the History of Architecture acquaints the student with events through the centuries which have influenced the development of architecture. World economics today is dealt with, also the history of structure and architecture. Under Draughting, training is given in the production of architectural working drawings. The use of building by-laws, standard handbooks, trade literature and sample specifications is emphasized. In Architectural Design, instruction is given in the production of architectural presentation drawing in various media. Unit and group designs in model form will be studied extensively. Methods of making approximate estimates of building costs will be investigated.

In the study of Structural Design and Draughting, the student learns of the characteristics, design and delineation of structural shapes, simple beams, columns, trusses and connections in wood and steel. Bending moment, shear, stress and framing diagrams are included; also elementary footing, pier and reinforced-concrete design. Rendering and Perspective deals with one, two and three point perspective rendered in various media. Outdoor pencil sketching will be given considerable attention.

Instruction and practise in the use of the six-foot rule, linen and steel tapes, transit, level and rod in building operations, will be given during the study of Surveying. Practice in which interior and exterior measurements are taken is included.

Under Contracts and Specifications, the various R.A.I.C. forms will be studied, also the purpose, interpretation and correlation of specifications. A study of modern sanitation, plumbing, also heating, ventilation and air-conditioning systems in their relation to architecture will be made.

Instruction in Mathematics, especially as related to surveying and structural design is a part of this course. Special attention will be given the preparation of letters, memoranda and architectural reports in the section devoted to a study of English. Self expression in writing and speaking will be cultivated.

The study program in Architectural Draughting is well balanced between theory and practice. The student has ample opportunity for inspecting on-the-job conditions. Some 25 per cent of the first year is spent in the R.I.T. building trade shops. Here, a knowledge of procedure is gained in such fields as carpentry, bricklaying, painting and decorating, plastering, sheet metal work, steam fitting, plumbing, electrical construction, also mill-room work. In this way the student learns of the actual construction of buildings and how to deal with problems involved.

Classes are assured of expert tuition in the person of Douglas G. W. McRae as director, who possesses extensive knowledge in the architectural field. Having graduated from the School of Architecture, University of Toronto as Bachelor of Architecture in 1929, he engaged in extensive travel and study in Europe. Returning, he received a fellowship at the George Washington University, Washington, D.C., and here secured a master of fine arts degree. Mr. McRae is an associate of the Royal Institute of British Architects and member of the Ontario Association of Architects. He spent the last 12 years

(Continued on page 432)

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INCORPORATED BY THE DOMINION PARLIAMENT 16th JUNE, 1908, 1st APRIL, 1912, AND 14th JUNE, 1929

42nd ANNUAL ASSEMBLY

As previously announced, the Forty-Second Annual Assembly of the Institute will be held on February 24th, 25th and 26th, 1949, at the General Brock Hotel, Niagara Falls, Ontario. The Programme Committee and the Committee on Arrangements are busy with the details for the three-day convention, and preliminary outline of these activities is given below.

Programme: As members will see by the train timetables given below, it will not be possible this year to start the meetings on Thursday morning. The first Committee meeting will be held on Thursday afternoon, and the Inaugural Session of the General Assembly will convene at 2:00 p.m. on Friday, February 25th. The full Programme will be published in a future issue of the *Journal,* and all members will receive their copy well in advance of the meetings.

Plans have been made to continue the Seminars which were such a great success last year. There will be two such Panel Discussions, both being held on Saturday afternoon. The speakers and their subjects will be announced in the next issue of the *Journal.*

Reservations: During December, each member of the R.A.I.C. will receive an advance notice of the meeting, giving the full details of the meeting arrangements. Enclosed with the notice will be a card noting room and train reservations requested, to be filled out and returned to the Institute Office. On receipt of these cards, the Institute Office will make the necessary train and hotel reservations for the members attending the Assembly.

This year, the Institute will handle train reservations from Toronto to Niagara Falls for any member requesting them. However, as has been the custom during the past few years, members are requested to arrange their own train accommodation as far as Toronto, and to make their reservations right through to Niagara Falls if they wish to do so. There are three trains a day from Toronto to Niagara Falls, and the following is a note of the best connections to be made by members travelling from outside Toronto:

Eastern Members: Make connection Montreal, arriving before 11:00 p.m. on February 23rd.

February 23rd, Wednesday —
Lv. Montreal at 11:00 p.m.

February 24th, Thursday —
Ar. Toronto at 7:30 a.m.
Lv. Toronto at 8:00 a.m.
Ar. Niagara Falls at 10:46 a.m.

Ottawa Members:

February 23rd, Wednesday —
Lv. Ottawa at 11:00 p.m.

February 24th, Thursday —
Ar. Toronto at 7:10 a.m.
Lv. Toronto at 8.00 a.m.
Ar. Niagara Falls at 10:46 a.m.

Western Members:

February 23rd, Wednesday —
Ar. Toronto at 7:30 a.m.
Lv. Toronto at 8:00 a.m.
Ar. Niagara Falls at 10:46 a.m.

All times and trains above are *C.N.R.,* and it should be noted that travel from Toronto to Niagara Falls must be by *C.N.R.* However, should members wish to travel as far as Toronto by C.P.R., in all cases connections can be made with the 8:00 a.m. train to Niagara Falls.

For the information of Toronto members, or other members wishing to make other connections to Niagara Falls, there are two other trains from Toronto to the Falls each day — one leaving at 1:35 p.m. and arriving at 4:33 p.m., and the other leaving at 8:40 p.m. and arriving at 10:50 p.m.

For the return trip, trains leave Niagara Falls for Toronto at the following times:

Lv. Niagara Falls at 6:45 a.m.	Ar. Toronto 8:55 a.m.
1:00 p.m.	3:25 p.m.
(Make connection with Montreal and Ottawa trains)	
4:45 p.m.	7:50 p.m.
7:15 p.m.	9:55 p.m.
(Make connection with Montreal, Ottawa and Western trains)	

ALBERTA

During the period from April to September of this year the value of building permits for single family dwellings in Calgary advanced fairly steadily at an increase of a million dollars per month from one to over seven millions; for apartment buildings from twenty thousand to two hundred and fifty thousand, an increase of approximately fifty thousand per month. In Edmonton the trend is similar or even more pronounced. The accommodation still fails to keep pace with the demand. The cost of building is at twice pre-war prices. Business buildings are holding a high level without progressive increase. The steadily increasing population requires and is getting a great increase in school and hospital accommodation throughout the province.

A number of schemes of various sorts are pressing for attention but for the most part are being relegated to the future. In Edmonton there is a persistent appeal for a new sports arena. There exists a good arena at the exhibition grounds. This can readily be filled to capacity and many citizens feel that they are practically excluded

from it because it takes either the consumption of much time or patience or some special ingenuity to obtain a ticket for admission. Similar arguments apply to the appeal for a hall for concerts except that no good concert hall exists. Sports lovers probably have the additional plea that a sport arena pays for itself, but they have the problem of making two pay for themselves.

Work has been started on a new bridge across the North Saskatchewan River at Edmonton. This is little more than a duplication of the present low level bridge alongside that crossing and promises nothing of the spectacular effect of the existing High Level Bridge. Yet it should appreciably ease the cross river traffic. A many-storied Federal Building for Edmonton has been on the drafting boards for years and still its probable precise location flits about like a will-o'-the-wisp now here now there. Another projected many-storied building is a centrally located first-class hotel. The need for this is very great but it has probably several fairly high hurdles to clear before it materializes.

Cecil S. Burgess

MANITOBA

The Council of the Manitoba Association of Architects, according to our practice in the last several years, have not held any meetings during the summer months, and met for the first time since June, this month. After dealing with a considerable amount of routine business there was a discussion in regard to the correspondence received during the summer from the President of the R.A.I.C. in regard to recent legislation in the Province of Saskatchewan to do with a new Engineers' Act. It was very enlightening to know that the R.A.I.C. are willing to take such an active part in assisting provincial associations in such cases.

We hope that Mr. Hazelgrove will find it possible to stop off in Winnipeg on his return from Regina and meet the members of our Association on their home ground. It was very much appreciated when Mr. Forsey Page visited our Association during his tenure of office, and we, in the west, think that it would be a good idea if each President of the R.A.I.C. could go on tour at least once during his term, and pay a short visit to each of the Provincial Associations. It would mean a direct contact with the R.A.I.C. which at present is only obtained for many of the component societies through their delegates each year to the annual assembly; this at best, is a second hand contact for the majority of the members. For those presidents who are interested in shooting we would suggest that the fall of the year would be a good time to visit Manitoba — then, after viewing our architecture we can introduce them to our ducks, geese, or prairie chicken.

In spite of soaring costs in the building industry, there is an ever increasing volume of work in the Architects' offices. We often wonder how far is up. To quote one of our prominent "Fellows" whom I was talking to last week: "This is the first time in my eighty years' experience in the trade when the Architects are not cutting each other's throats."

H. H. G. Moody

ONTARIO

It is most encouraging to look over the architectural periodicals of the day and see the progress that is being made in the design of primary and secondary school buildings. This progress, however, has not been extended to include our Universities. Everyone looks to this latter group as the ultimate in progressive thinking and experiment and it is unfortunate that the visual result is so unsatisfactory.

The governing bodies of our Universities have one line of defence only for their building programs — "they must continue the architectural style of the existing buildings." Can we imagine the medical scientists attempting to decrease the mortality rate if they used only the herbs and drugs of mediaeval times? This comparison may seem extreme but it is really not so far out of line. The Universities must act as leaders in communities not only in academic ways but also in material ways. We all know that any university campus is a place of civic interest and as such could do much in its locality to further good Contemporary Architecture. If it is felt that these buildings should be impressive, then how much better is the clear and well defined beauty of Cranbrook's buildings than the restricting imitation Gothic of our existing structures!

The argument is now bound to arise as to the manner in which contemporary buildings can be placed among the existing structures. One has only to see the new swimming pool at Massachusetts Institute of Technology to realize how well this can be done. An even more recent example is to be seen in the new Mechanical Building at the University of Toronto. These buildings have in no way marred the existing structures, but rather have given stimulus to the new movement.

The blame for the existing sad state of University Architecture cannot be placed directly on the shoulders of the Architects, but must fall in a much larger share on the Senates of these Institutions. Excellent solutions for buildings have been either shelved completely or so altered by these Boards as to bear no relation to the original designs. Not only did they change the elevations to conform with the existing patterns, but they sacrificed also the functional plans to achieve artificial results.

Surely if the educational leaders of our land can put aside the marble monuments of the past to produce better elementary schools then why not better university structures? And why shouldn't we as architects try to encourage our Alma Maters to take greater responsibility in the ever-growing movement of good Contemporary Architecture?

Peter Tillmann

MORE ABOUT PANEL HEATING

(Continued from page 405)

Even in factories, which now are predominantly of single storey type, ceiling panels are often preferable, as they are not affected by equipment layout and counteract the cooling effect of the roofs, monitors, etc.; here, occasionally panels have been used which are not integral with the structure, giving more responsive control, better and easier maintenance, etc. Another reason for ceiling panels in factories is the freedom from worry about oils, greases, acids, etc., that may spill on and penetrate floors to a point where they could be detrimental to pipes. They also obviate the warning which is becoming commonplace in floor-heated plants and buildings that "any drilling or cutting of floor is strictly prohibited." A factory where the machinery must not be fastened to the floor has often only very limited usage.

It is noteworthy that this trend to the true radiant heating confirms the practice which is predominant in the countries where it has been used extensively for several decades. No doubt there are sometimes objections to the use of radiant heating; some ceiling constructions are difficult to adapt to its use, and the securing and levelling of the coils may be somewhat more difficult than it is on the formwork of concrete floors, etc. The lessons gleaned from a careful analysis and from the history of this heating form are, however, quite definite and clear, and should not be brushed aside.

SCHOOL OF ARCHITECTURAL DRAUGHTING OPENS IN TORONTO

(Continued from page 428)

teaching in Toronto technical schools, becoming the director of the School of Architectural Draughting under the wartime rehab. scheme in 1944, after serving in the R.C.A.F. for two years.

The place of the Ryerson Institute of Technology in the architectural field is recognized by the Ontario Association of Architects who have given full co-operation in every way. In the opinion of this group, "the work the Institute can do, will be an acceptable contribution to the whole scheme of building." Last year, the Toronto chapter of this organization sponsored evening classes under the rehab. set-up. And this was found to serve an important need in improving the education and skill of young draughtsmen employed in architectural offices. Students had the benefit of instruction from members of the architectural profession. Each week practising architects visited the classes in the capacity of critics, providing valuable information from their own practical experience. It is hoped that this practice will be continued this year.

Present registration in the course in Architectural Draughting includes fourteen students from Ontario with one from Mexico. The cost of this course puts specialized training within the reach of average income groups. Fee for Ontario residents is $25.00. Students from outside the province — and British subjects pay $200.00. For others $300.00. A registration fee of $10.00, shop and laboratory deposit of $10.00 and Student Council fee of $5.00 is also required.

This new educational development in Ontario fills an important need in training workers for industry. In raising educational standards, it adds to the culture of young Canadians and contributes to the efficiency of industry as a whole.

CONTRIBUTORS TO THIS ISSUE

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Grace Younkie

Began her writing career in a Toronto advertising agency, later branching out into the free lance field. A regular contributor of articles to Canadian and United States magazines, radio writing is also included in her activities.

PROFESSIONAL ITEM

L. G. MacDonald, B.Sc. (Arch.) M.R.A.I.C., formerly on the staff of Marani and Morris, Toronto, is now associated with his brother, Fred H. MacDonald, Registered Architects, 220 Kresge Building, Edmonton, Alberta.

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O CANADA

TORONTO DAILY STAR, Thursday, November 4, 1948.

WHERE IS TORONTO'S ANTI-SMOKE LAW?

It has been estimated that over 800 tons of tar, carbon and ash are deposited per square foot each year in Toronto's downtown area.

EDITOR'S NOTE:

The street cleaning department is justly proud of its new equipment. It has to be good to cope with two tons settling on every square foot during the day.